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SEASONAL ABUNDANCE OF SOME JAPANESE PIPUNCULID FLIES (DIPTERA : PIPUNCULIDAE) IN PADDY FIELDS¹⁾

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Abstract

As part of the studies on the pipunculid flies in paddy fields, their seasonal abundance and percentage parasitism in the green rice leafhopper *N. cincticeps* were studied in insecticide-treated and untreated paddy fields. Four pipunculid species were frequently caught from August to October. The percentage of parasitism in host adults by the flies was high in June- July and in October-November.

Introduction

Twenty-two species of the Pipunculidae have been recorded from Japan to date, and 15 of them are paddy field dwellers (Yano et al., 1984 ; Yano, 1985). In the Yamaguchi area, 4 species* parasitic on the green rice leafhopper, *Nephotettix cincticeps* (Uhler), are usually found in paddy fields : *Tomosvaryella oryzaetora* Koiiumi, *Pipunculus* (*Eudorylas*) *mutillatus* Loew, *P. (E.) javanensis* de Meijere and *P. (E.) orientalis* (Koizumi). Adult behavior and biology of these species have been reported (Morakote and Yano, 1987 ; 1988a, b), and their seasonal abundance and percentage parasitism in the host are described in this paper.

Few records have been presented on the percentage parasitism of *N. cincticeps* by pipunculid flies in Japanese paddy fields (Ouchi and Suenaga, 1964 ; Inishi, 1968 ; Hokyo, 1972). Two of these surveys were supposedly made in insecticide-treated paddy fields during the rice growing season, and the other was made in both treated and untreated paddy fields but ended in July. The present survey covered all seasons and was made in three sites of treated and untreated paddy fields.

¹⁾ Fauna and biological studies on the insects of paddy fields in Asia. XXIX.

* A series of papers on systematic studies on the Japanese Pipunculidae by the first author will be published elsewhere in which some of the species mentioned here will be changed on their combination of species name (Morakote et al., in press).

Some records on the life cycle or seasonal occurrence of pipunculid flies have been presented from observations made in general vegetation outside Japan. Most of them reported only the number of annual generations, and few mentioned seasonal changes in the number of adults collected (Whittaker, 1969; Jervis, 1980).

We present here the seasonal abundance of the pipunculid flies and percentage parasitism of *N. cincticeps* by the flies in paddy fields in Japan during March to November.

Materials and Methods

Regular sweepings were made in 1983 and 1984 at three paddy field sites in Yamaguchi City to learn the seasonal abundance of the adult pipunculid flies and the percentage parasitism in their host, the green rice leafhopper (*N. cincticeps*). Two paddy fields surveyed (Sites 1 and 2) were conjoined on Yamaguchi University Farm, and the other one (Site 3) belonged to a private farmer about 1 kilometer away from the University Farm. Site 1 has had no insecticides applied since 1977, but is small in acreage and situated at the border of paddy fields of the farm. Sites 2 and 3 were under conventional insect pest control management. At Site 2, insecticides were applied 8 times in 1983 (June 30, July 13, August 3 and 8, September 5, 14, 16 and 30) and 3 times in 1984 (September 6, 21 and 28). The insecticides used were Isoprocarp (MIPC), Smithion (MEP), Dipterex (DEP), Disulphoton, Baycid (MPP) and Propaphos. No information is available for insecticides applied to Site 3.

Samplings were carried out from June 1983 to November 1984 at 10 day intervals. One hundred sweeps by insect net (42 cm in diameter) on rice plants during the rice growing season, and on weeds in the paddy fields and adjoining levees during the remainder of the season were made. The samples caught were killed and brought back to the laboratory. Adult pipunculid flies were counted and identified, and adult *N. cincticeps* were counted and dissected to record the percentage of parasitism caused by the pipunculid flies. Though eggs and larvae of the flies were found in host nymphs (Morakote and Yano, 1987), only the percentage parasitism in host adults was calculated in this study. When more than 100 host adults were collected from one site, only 100 of each sex were dissected.

In addition to the regular sweepings, occasional sweeps were made to collect host hoppers in Sites 2 and 3 and other paddy fields. Twenty-four collections were made between March 9 and October 25 in 1983, and 19 collections from April 11 to October 25 in 1984. Host hoppers collected in these sweeps were reared to obtain the pipunculid flies they contained, thus providing supplementary data on seasonal abundance.

Results and Discussion

1. Seasonal abundance

Data on the regular sweepings and rearings of hosts obtained in occasional sweeps show that the pipunculid flies were present from late April to around late November or the middle of December. The earliest emergence was March 30 (1983, *P. orientalis*), but this rearing was made at 30°C. At room temperature, the flies emerged on April 22-24 (1983, *P. mutillatus*). Fourteen specimens of *P. mutillatus* and *P. javanensis* emerged between November 26 and December 20 (1983) at room temperature. In regular sweeps, the first specimen was collected on May 15 (1983, *P. mutillatus*) and the last ones on November 16 (1984, *P. orientalis*). These data are similar to those reported by Asai and Yano (1988) whose observations were made in 1979 and 1980 in the Yamaguchi area.

Seasonal catches of adult *T. oryzaetora*, most frequently found in this study, collected in regular sweepings from the sites are shown in Fig. 1 and the combined catch of 4 species including *T.*

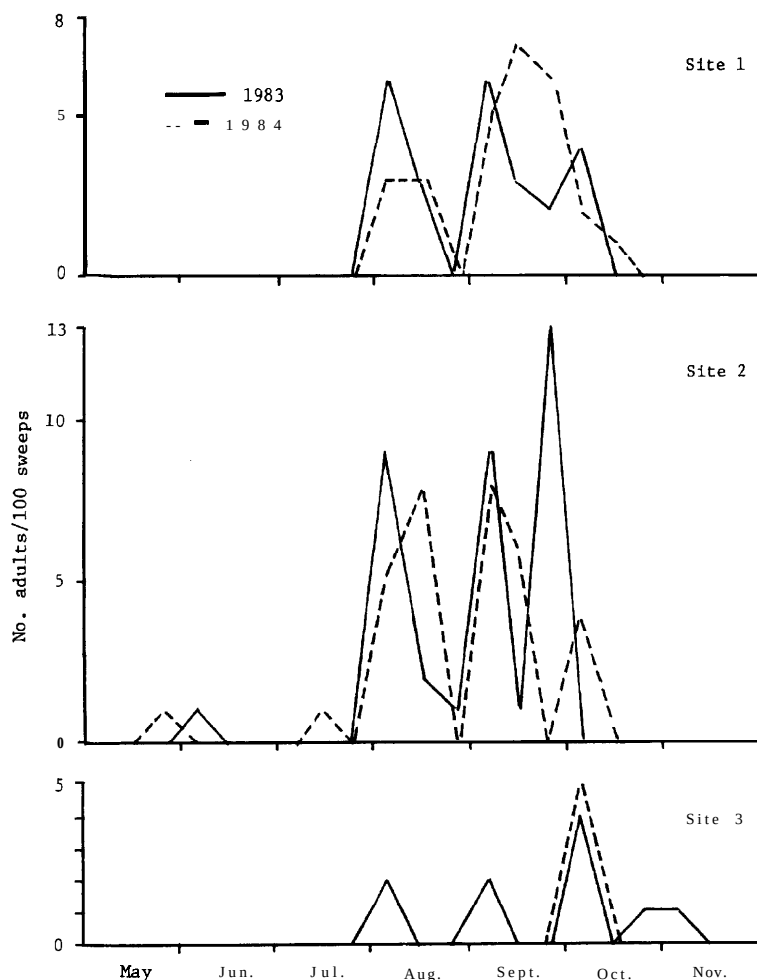


Fig. 1. Seasonal patterns of abundance of *Tomosvaryella oryzaetora* in paddy fields (Yamaguchi City, sweepings, 1983-1984) (Site 1 : insecticide untreated ; Sites 2 and 3 : insecticide treated).

oryzaetora is shown in Fig. 2. According to these data and the parasitism in the host described later, the pipunculid flies in this area may have 5 generations a year, if *T. oryzaetora* is representative of them. Three marked peaks are seen both in seasonal catches of the 4 species (Fig. 2) and in *T. oryzaetora* (Fig. 1). The most abundant number of catches was made during the period from August to October. This indicates that fewer pipunculid flies are in paddy fields when the rice plants have not yet been planted or are young and following harvest.

As in Fig. 1, fewer specimens of *T. oryzaetora* were collected in Site 3 than other sites. The reason for this is unknown, since data on insecticide application to Site 3 are not available.

2. Percentage parasitism

Seasonal catches of adult *N. cincticeps* obtained by regular sweepings from the 3 sites are shown in Figs. 3-5 as well as the percentage parasitism by the 4 pipunculid flies. Many adult *N. cincticeps* were collected from the middle of August to the end of September and fewer before and after that

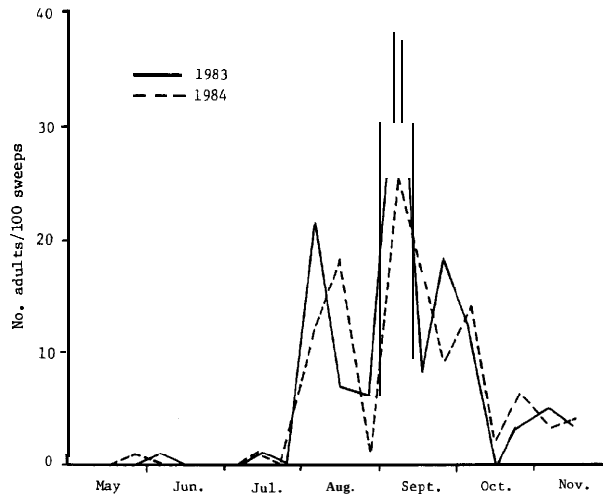


Fig. 2. Seasonal patterns of abundance of 4 pipunculid species in paddy fields (Yamaguchi City, sweepings of Sites 1-3, 1983-1984) (for species, see text).

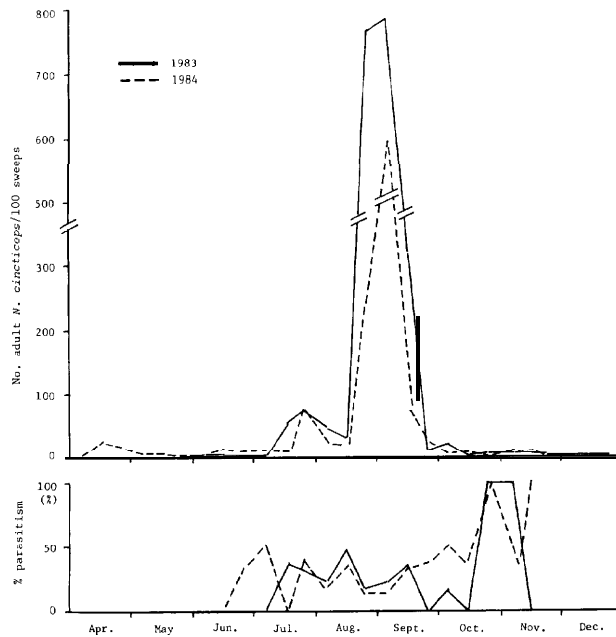


Fig. 3. Seasonal patterns of abundance of adult *Nephrotettix cincticeps* and percentage parasitism by the pipunculid flies in paddy fields (Yamaguchi City, sweepings of Site 1, 1983-1984).

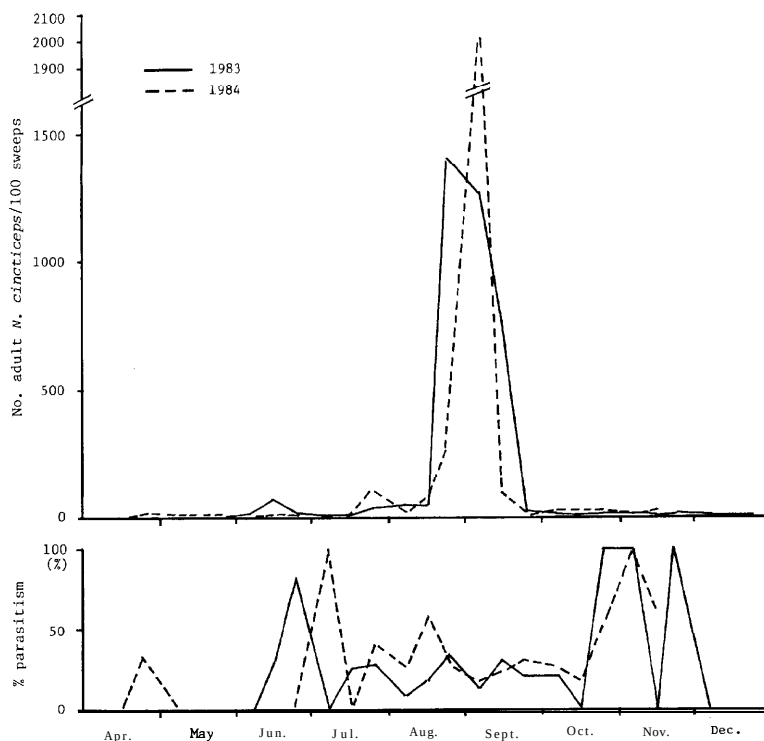


Fig. 4. Seasonal patterns of abundance of adult *Nephrotettix cincticeps* and percentage parasitism by the pipunculid flies in paddy fields (Yamaguchi City, sweepings of Site 2, 1983-1984).

period both years studied. This pattern was the same in the 3 sites surveyed, although in Site 3 a rather large peak was seen in April, 1984. This may be explained by the rich vegetation available for overwintering surrounding the site, and paucity in the other two sites.

Percentage parasitism in adult hosts in Site 1 (Fig. 3) was rather low (averaging 27.4%) during July to September when hosts were probably in the second to fourth generations. During October and November, it suddenly increased (averaging 58.9%) and reached 100% in some collections. In Site 2 (Fig. 4), the percentage parasitism was somewhat different; a high level was recorded in late June or early July and in October and November. The seasonal pattern in Site 3 (Fig. 5) was similar to that in Site 2; it was low in August and September, although the fluctuation was not as drastic as in Sites 1 and 2.

In comparing the parasitism among the 3 sites during the July to September period when there are rice plants, that in Site 1 was higher than in the two other sites (averaging 27.4% in Site 1, 23.5% in Site 2 and 24.3% in Site 3). It is not certain whether or not this difference is due to insecticide application. Hokyō (1972) stated he found no difference in percentage of parasitism by pipunculid flies between two nymphal populations of *N. cincticeps* of insecticide-treated and untreated paddy fields. The present data were derived entirely from adult hosts and may explain the difference in these two surveys.

In all 3 sites, the parasitism was almost 100% after harvesting. In Sites 2 and 3, it was also high in late June. Periods of high parasitism coincided with the seasons when the host population density was low.

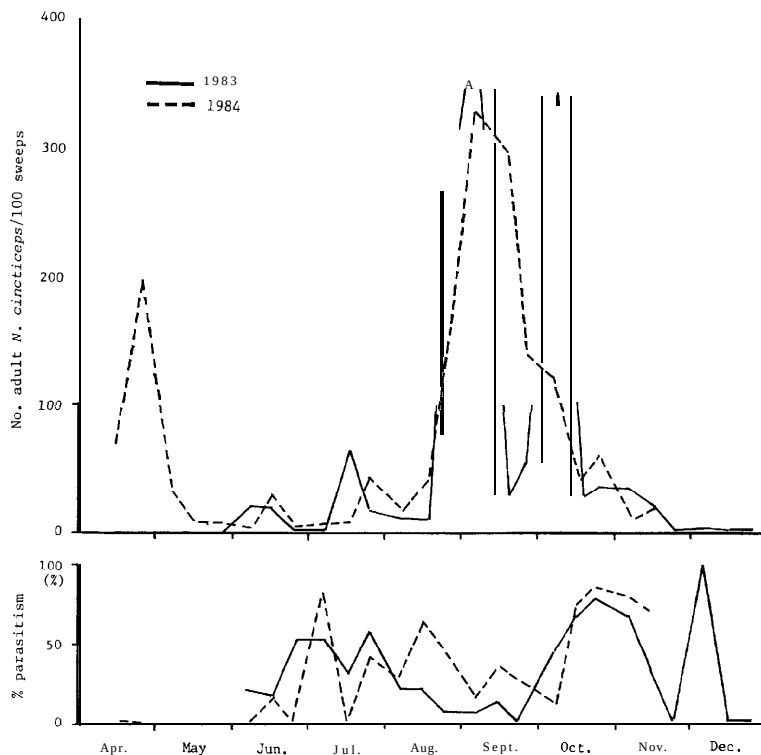


Fig. 5. Seasonal patterns of abundance of adult *Nephrotettix cincticeps* and percentage parasitism by the pipunculid flies in paddy fields (Yamaguchi City, sweepings of Site 3, 1983-1984).

Inishi (1968) reported that the average parasitism in nymphs of *N. cincticeps* by pipunculid flies was 11.9%, though he recorded 100% in April. Hokyō (1972) recorded that it was 23.0% in males and 42.7% in females in the second host generation, and 9.9% in males and 29.6% in females in the third generation. These figures are lower than the present results.

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Literature cited

- Asai, I. and K. Yano, 1988. Pupation site and overwintering of some Japanese Pipunculidae (Diptera) parasitizing *Nephrotettix cincticeps* (Hemiptera : Deltocephalidae). *Trans. Shikoku ent. Soc.*, 19(1/2): 11-15.
- Hokyō, N., 1972. Studies on the life history and the population dynamics of the green rice leafhopper, *Nephrotettix cincticeps* Uhler. *Bull. Kyushu agr. Expt. Sta.*, 16: 283-382. (In Japanese with English summary)

- Inishi, N., 1968. [Occurrence and parasitism of Pipunculidae parasitic on the green rice leafhopper]. *Noyaku Kenkyu*, 15 : 34-37. (In Japanese)
- Jervis, M. A., 1980. Studies on oviposition behavior and larval development of *Chalarus* (Diptera, Pipunculidae), parasites of typhocybina leafhoppers (Homoptera, Cicadellidae). *J. nat. Hist.*, 14 : 759-768.
- Morakote, R., Y. Hirashima and K. Yano, 1990. A systematic study of the Japanese Pipunculidae (Diptera). Part V. The genus *Eudorylas* Aczél. *J. Fac. Agr., Kyushu Univ.*, 34 : 281-356.
- Morakote, R., Y. Hirashima and K. Yano, 1990. Ditto. Part VI. The genera *Dorylomorpha* Aczél and *Tomosvaryella* Aczél. *J. Fac. Agr., Kyushu Univ.*, 34 : 357-396.
- Morakote, R. and K. Yano, 1987. Morphology of immature stages of some Japanese Pipunculidae (Diptera) parasitizing *Nephotettix cincticeps* (Hemiptera, Deltocephalidae). *Kontyû*, 55 : 176-186.
- Morakote, R. and K. Yano, 1988a. Biology of some Japanese Pipunculidae (Diptera) parasitizing *Nephotettix cincticeps* (Hemiptera, Deltocephalidae). *Bull. Fac. Agric., Yamaguchi Univ.*, 35 (1987) : 9-22.
- Morakote, R. and K. Yano, 1988b. Adult behavior of some Japanese Pipunculidae (Diptera) parasitizing *Nephotettix cincticeps* (Hemiptera, Deltocephalidae). *Kontyû*, 56 : 653-658.
- Ouchi, Y. and H. Suenaga, 1964. Field habits of Dorilaidae parasiting on the green rice leafhopper, *Nephotettix cincticeps* Uhler. *Kyushu Nogyo Kenkyu*, 26: 136-137. (In Japanese)
- Whittaker, J. B., 1969. The biology of Pipunculidae (Diptera) parasitising some British Cercopidae (Homoptera). *Proc. R. ent. Soc. Lond.*, (A) 44: 17-24.
- Yano, K., 1985. Japanese Pipunculidae dwelling in paddy fields. *Makunagi*, 13 : 9-12. (In Japanese)
- Yano, K., M. Ishitani, I. Asai and M. Satoh, 1984. Faunal and biological studies on the insects of paddy fields in Asia. XIII. Pipunculidae from Japan (Diptera). *Trans. Shikoku ent. Soc.*, 16(4) : 53-74.